STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE (HLW) CANISTER DECONTAMINATION HANDLING SYSTEM (HDH) ANCILLARY EQUIPMENT

BECHTEL

Job No 24590

Bechtel National, Inc

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
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G-321 Document Category N/A
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Supersedes BNI Document No. _____ Rev _____
[When applicable]

Accepted by M. W. Hoffmann (Print Name) _____ (Signature) 5/19/05 (Date)

Released by _____ (Print Name) _____ (Signature) _____ (Date)
[When applicable]

416 GP&S 7-03

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

24590-CM-HC4-HXYG-00138-02-00055 Rev 00A

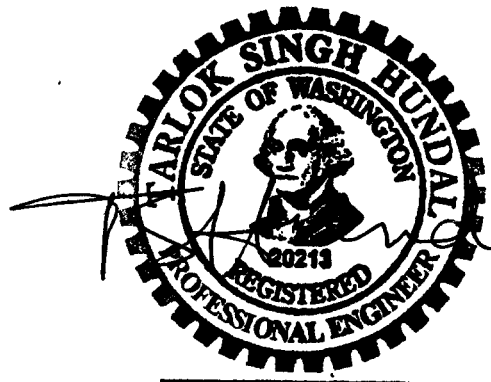
IQRPE REVIEW
OF
THE HIGH LEVEL WASTE (HLW) CANISTER DECONTAMINATION HANDLING SYSTEM (HDH) ANCILLARY EQUIPMENT

"I, Tarlok Hundal have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the High Level Waste (HLW) Canister Decontamination Handling System (HDH) Ancillary Equipment as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design fully satisfies the requirements of the WAC.

The attached review is seven (7) pages numbered one (1) through seven (7).



EXPIRES: 02/15/06

T S Hundal
Signature

5/13/05
Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses ancillary equipment associated with the High Level Waste (HLW) Canister Decontamination Handling System (HDH) vessels located in the south east corner of the HLW facility. The ancillary equipment associated with these vessels is shown on P&ID drawings 24590-HLW-M6-HDH-P0001, -P0002, and -P20001. This includes the ancillary equipment associated with the following HDH vessels : (1) One Canister Rinse Bogie Decon Vessel (HDH-VSL-00001) located at Elevation (-) 16'-6" in Room H-B039B; a secondary containment structure. (2) Two Canister Decon Vessels (HDH-VSL-00002/4) and one Waste Neutralization Vessel (HDH-VSL-00003), all located at Elevation (-) 16'-0" in Room H-B035; a secondary containment structure. Ancillary equipment located inside the HLW (HDH) system vessels is addressed separately in the Integrity Assessments for these plant items.
References	Drawings and System Description	Drawings: 24590-HLW-P1-P01T-P0001, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Plan at El.(-)21'- 0"; 24590-HLW-P1-P01T-P0002, Rev. 3, HLW Vitrification Building General Arrangement (Permit) Plan at El. 0'- 0"; 24590-HLW-P1-P01T-P0009, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Sections D-D, E-E & F-F; 24590-HLW-P1-P01T-P0010, Rev. 6, HLW Vitrification Building General Arrangement (Permit) Section G-G & H-H; 24590-HLW-M6-HDH-P0001, Rev. 1, P&ID –HLW Canister Decontamination Handling System; 24590-HLW-M6-HDH-P0002, Rev. 1, P&ID – HLW Canister Decontamination Handling System; 24590-HLW-M6-HDH-P20001, Rev. 1, P&ID – HLW Canister Decontamination Handling System; 24590-HLW-M5-V17T-P0006, Rev. 2, P&ID –Process Flow Diagram HLW Canister Decon (System HDH). 24590-QL-POA-MQTS-00002-01-86, Rev. 000C, Decontamination Vessel Pump Assembly (HDH-PMP-00001); 24590-HLW-P3-HDH-WS00010001, Rev. 0, HLW Vitrification Isometric (Line No. HDH-WS-00010-T11A-1); 24590-HLW-P3-HDH-ZT00008001, Rev. 0, HLW Vitrification Isometric (Line No. HDH-ZT-00008-S11P-1); 24590-HLW-P3-HDH-PA00003001, Rev. 1, HLW Vitrification Isometric (Line No. HDH-PA-00003-T11A-3); 24590-HLW-P3-HDH-DB00007001, Rev. A, HLW Vitrification Isometric (Line No. HDH-DB-00007-T11A-1); 24590-HLW-P3-HDH-PA00007001, Rev. A, HLW Vitrification Isometric (Line No. HDH-PA-00007-S11F-2); 24590-HLW-HDH-H00013, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H00015, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H30050, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H20004, Rev. 0, Pipe Support Drawing; 24590-HLW-HDH-H30003, Rev. 0, Pipe Support Drawing. System Description: 24590-HLW-3YD-HDH-00002, Rev. 2, System Description for HLW System Canister Decontamination Handling.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to ensure that the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

Information Assessed		Source of Information	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria identifies ASME B31.3 as the design code for piping systems of the WTP. The Process System Description document states that the HDH system does not have any important to safety function. Drawings show that the ancillary equipment is of commercial quality grade and is Seismic Category SC-III. The Pipe Stress Design Criteria document provides a detailed discussion of seismic categories. The codes and standards used are acceptable and adequate for the design of the ancillary piping for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-3DP-G04T-00906, Rev. 2, Isometric Drawings and Associated Calculations.	The ancillary equipment are designed and built to the design standards and codes. The Pipe Stress Design Criteria specifies that piping is to be designed in accordance with ASME B31.3 Code. The review of the sample isometric drawings listed in References and of the design process and controls described in Isometric Drawings and Associated Calculations document provides adequate assurance that HDH ancillary equipment are properly designed, installed, and verified to meet the requirements of the applicable design criteria established for the project. The documentation reviewed demonstrates that sound design engineering principles are used for the design and construction.

Information Assessed		Source of Information	Assessment
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; Uniform Building Code (UBC), 1997; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment.	The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code for process piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME Section III, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 for seismic design of Seismic Category (SC-III/IV) ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to assure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

Information Assessed		Source of Information	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 3, Pipe Support Design Criteria; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Rules for Construction of Nuclear Power Plant Components, American Society of Mechanical Engineers, 1995; Uniform Building Code (UBC), 1997; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). 24590-QL-POA-MQTS-00002-02-10, Rev. 00B, Stress Analysis of Decontamination Pump Support Frame; 24590-WTP-3DP-G04T-00906, Rev. 2, Isometric Drawings and Associated Calculations.	The Pipe Support Design Criteria document considers all loadings identified in ASME B31.3 and utilizes ASME BPV Code, Section III, Division 1, Subsection NF and Appendix F and UBC, to supplement the requirements of ASME B31.3 for seismic design of Seismic Category (SC-III/IV) pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Examples of typical ancillary equipment supports are shown in the Ancillary Equipment Pipe Support Design document. Analysis is by manual calculation or approved computer programs that have been verified and validated. These are appropriate codes and standards for design of ancillary equipment supports for the HDH system. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures. The temperature of the building structures is not to exceed 150°F for concrete and 200°F for steel. The review of the sample isometric drawings, support calculations, and drawings and that of the design process and controls described in Isometric Drawings and Associated Calculations document provides sufficient assurance that HDH ancillary equipment supports are adequately designed, installed, and verified to meet the requirements of the applicable design criteria established for the project.
	The system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 6, Structural Design Criteria.	The HDH ancillary equipment system considered in this assessment is located inside the process cells at Elevation (-) 16'-0", in the HLW facility. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The HLW facility structural foundations are well below the grade elevation, therefore, the HDH system is not subjected to any frost heave effects.

Information Assessed		Source of Information	Assessment
Connections	Seams and connections are adequately designed.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME B16.5, Piping Flanges and Flanged Fittings, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. ASME B16.5 is specified for flange designs. These are appropriate codes and standards for design and fabrication of the HDH System ancillary equipment.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 2, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The HDH System Description states that the Canister Rinse Bogie Decon Vessel (HDH-VSL-00001), Canister Decontamination Vessels (HDH-VSL-00002/4), and Waste Neutralization Vessel (HDH-VSL-00003) have no important to safety functions. The primary function of the HDH ancillary equipment is containment of the radioactive decontamination fluids. The Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems document indicates that flammable or explosive concentrations of hydrogen are not expected in the HLW facility systems ancillary equipment. Similarly, the Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems document provides a summary of the HLW facility ancillary equipment design features that provide for confinement and treatment of chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a Design Basis seismic event.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under References; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment.	The Materials for Ancillary Equipment document specifies that ancillary equipment materials that contact the waste are to be equal to or better than those of the upstream source vessels. The System Description states that compatible reagents (Nitric Acid from tank NAR-TK-00001, Ceric Nitrate from tank HDH-TK-00002, and Hydrogen Peroxide from tank HDH-TK-00003) are added to the HDH vessels during normal operations.

Information Assessed		Source of Information	Assessment
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	24590-WTP-DB-ENG-01-001, Rev. 1C, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev. 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation.	The Basis of Design document identifies a service design life of 40 years for the ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the HLW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM standards and tests to preclude external corrosion of ancillary equipment. Therefore, the ancillary equipment will provide the expected design service life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	System Description listed above under References; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description. 24590-WTP-DB-ENG-01-001, Rev. 1C, Basis of Design;	ASME B31.3 is the design code for the WTP piping. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service life of 40 years is identified in the Basis of Design for ancillary equipment. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the HLW facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel. Corrosion/Erosion allowances are listed for the ancillary equipment (each piping class and associated valves, fittings, etc.) in the Piping Material Class Description document.

Information Assessed		Source of Information	Discussion
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers.	The Pipe Stress Design Criteria document specifies ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed.
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 4, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description.	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. Piping material classes are shown on the P&ID drawings, embedded in the item numbers for each ancillary equipment component. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References.	The ancillary equipment considered in this assessment is located in Rooms H-B039B and H-B035, within the HLW building. These HLW rooms or cells are secondary containment concrete structures provided with stainless steel liner plates and sumps (HDH-SUMP-00001/3), as shown on the general arrangement drawings, which are outside the scope of this integrity assessment. The assessment of the secondary containment structures is conducted in a separate document.